2 IS MY COMMUNITY AT RISK?

"Recent major earthquakes . . . attest to the need for considering such natural hazards, their possibility of occurrence and their consequences. Because our expanding population is concentrated in large metropolitan centers with a proliferation of man-made structures and facilities, the number of incidents and extent of the consequences . . . from such disasters can be expected to increase in the years ahead. Even in geographical areas where seismic risk is assumed to be low, as in the eastern United States, consequences of a possible large earthquake are serious and require careful consideration."

– N. M. Newmark and W. J. Hall, University of Illinois

WHO IS AT RISK?

A severe earthquake is one of nature's most terrifying and devastating events, and collapsing structures and falling debris do most of the killing. The Loma Prieta and Northridge earthquakes in California in 1989 and 1994, respectively, and the Kobe earthquake in Japan in 1995 showed the nation just how horrifying an earthquake is while also illustrating that modern buildings, designed and constructed under up-to-date seismic regulations, will perform well. Such regulations, however, have not been adopted in many areas of high to moderate seismic risk in the United States.

Many people assume that earthquakes are primarily confined to the West Coast when, in fact, more than 70 million Americans in 44 states are at some risk from earthquakes (see Appendix D for an overview of U.S. seismicity). Indeed, three of the most severe U.S. earthquakes occurred, not on the West Coast, but in the East and Midwest: in Charleston, South Carolina, in 1886; at Cape Anne, Massachusetts, in 1755; and in New Madrid, Missouri, in 1811-12. The New Madrid event involved a series of three major shocks that affected a 2 million square mile area, which is equal to about two thirds of the total area of the continental United States excluding Alaska. The Charleston earthquake also had a "felt" area of 2 million square miles.

Unfortunately, scientists cannot now predict precisely when and where a damaging earthquake will occur or anticipate accurately the range of damaging effects. This lack of detailed knowledge leads some people to believe the risk is minimal. This is especially true in areas east of the Sierra Mountains. Nevertheless, the forces that caused major shakes in the past in the eastern and central states have not dissipated, and seismic specialists expect damaging earthquakes to occur again in these areas even though they cannot predict exactly when or precisely where they will happen. In this respect, it should be noted that an earthquake of a given size or magnitude will affect a much larger area in the eastern and central states than it will on the West Coast because the ground in the eastern and central portions of the country transmits certain earthquake waves much farther.

WHAT IS AT RISK?

Of most serious concern is the high concentration of population and structures in areas that were only sparsely populated at the time of the last major quake. If the earthquakes that occurred in the New Madrid area in 1811-12 were to occur again today, they would affect 2,400,000 people and 24 sizeable cities located in 7 states (Missouri, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, and Illinois) and would fall within the responsibilities of 4 separate federal regions. Such an earthquake event would significantly disrupt major commercial distribution networks, oil and gas pipelines, and interstate commerce and would cause thousands of casualties and leave many more homeless. Further, the several major tremors that occurred in the 1811-12 event were followed by two years of aftershocks that were sizeable tremors in their own right. Even moderate earthquakes can do significant damage, and Chapter 3 presents photographs of typical damage from a number of such earthquakes.

Between 1900 and 1986, about 3,500 lives were lost as a result of earthquakes in the United States and property damage amounted to approximately $5 billion (in 1979 dollars). Since 1987, however, earthquake-related property damage has more than exceeded that amount. The 1987 Whittier Narrows earthquake in the Los Angeles area caused three deaths and over $350 million in property damage, the 1989 Loma Prieta earthquake in the San Francisco Bay area caused 62 deaths and over $5 billion in property damage, and the 1994 Northridge earthquake in the Los Angeles/San Fernando area caused 57 deaths and over $20 billion in losses (if the Northridge earthquake had occurred a few hours later on a normal workday instead of a public holiday, the death toll could easily have run into the thousands).

WHAT SHOULD BE DONE?

Many variables contribute to seismic activity. The nature of the hazard varies considerably throughout the United States and so do the risk and the vulnerability of different communities. Thus, it is very important that the nature of the hazard in a specific community be understood. One cannot simply adopt the ordinance, program, or approach of a community in one seismic area and expect that it will be technically appropriate or useful in a different community in another seismic area. What works in a medium-size community in California, for example, is unlikely to work in a small town in Missouri.

Communities throughout the United States therefore need to assess their seismic situation and take into account the amount of development that has occurred and the highly populated areas that now exist in areas at risk from moderate and major earthquakes. It is especially important that cities east of the Sierra Mountains give more attention to these issues so that they can adequately assess the need for seismic-resistant construction techniques for their buildings and other essential structures.

INFORMATION SOURCES

To obtain the information needed to define your community's seismic situation, contact:

- Geologists, geophysicists, and seismologists at your local academic institutions;
- Your state's geologist;
- Regional offices of the Federal Emergency Management Agency (FEMA) and U.S. Geological Survey (USGS) and the Internet resources offered by these agencies; and
- National and regional earthquake information organizations.

The names and addresses of many sources of information are listed in Appendix E as are publications that will provide additional information. Information from FEMA is available on the Internet at http://www.fema.gov. For the USGS, go to http://geology.usgs.gov. Other electronic resources on earthquakes also are available on the Internet and many are listed in Appendix E.

A general discussion of seismic phenomena is included in Appendix C of this handbook and an overview of U.S. seismicity appears as Appendix D.